

from base of radial area, apical areas eight; wings with six apical areas.

Type, *D. truncatella*, Walk. (*Cicada*).

The principal characters of this genus are to be found in the structure of the tegmina.

Abricta Elseyi, sp. n.

Head black, the front castaneous, the ocelli and a central spot at base of vertex ochraceous; pronotum pale castaneous, with a central longitudinal ochraceous fascia, which is much amplified posteriorly and a little so anteriorly, posterior margin more or less piceous; mesonotum ochraceous, with four obconical castaneous spots, of which the two outermost are much the largest and occupy the whole lateral areas, cruciform elevation castaneous; abdomen castaneous, greyishly pilose; body beneath and legs castaneous, greyishly pilose, head beneath (excluding face) black; tegmina and wings hyaline; tegmina with the veins and costal membrane brownish ochraceous; wings with the venation ochraceous, the whole anal area pale golden yellow, posteriorly margined with fuscous; rostrum passing the intermediate coxæ; opercula in male obliquely directed inwardly, but scarcely extending beyond base of abdomen.

Long., excl. tegm., ♂ 19 mm.; exp. tegm. 60 mm.

Hab. North Australia: Victoria River (*Dr. J. R. Elsey*, Gregory Exploration Exped., Brit. Mus.).

Allied to *A. ruber*, God. & Frogg., but tegmina apically unspotted, different colour of head and anal area to wings, shorter ulnar areas to tegmina, &c.

XXX.—On the Bats of the *Rhinolophus arcuatus* Group, with Descriptions of Five new Forms. By KNUD ANDERSEN.

General Characters of the Group.

Brief diagnosis.—Median anterior nasal swellings large and abruptly projecting. Sella approximately ovate in shape. Tail much shorter than tibia.

Skull.—Chiefly characterized by the large, almost semi-globular, and strongly projecting median nasal swellings. Palatal bridge rather short, between $\frac{1}{4}$ and $\frac{1}{3}$ the length of

the maxillar tooth-row; median anterior point opposite front of m^1 , median posterior point level with middle of m^2 . Basioccipital not unusually narrowed.

In *Rh. arcuatus* the premolars and molars are comparatively small, the temporal fossa narrow; the zygomatic breadth of the skull, therefore, practically the same as the mastoid breadth; the sagittal crest low, very gradually passing into the supraorbital ridges. *Rh. euryotis* shows the other extreme: the larger teeth have caused a stronger development of the temporal muscle, a widening out of the temporal fossa, therefore a markedly larger zygomatic width of the skull, a heightening of the sagittal crest, especially in front, making the declivity of this latter towards the post-nasal depression more abrupt*. These two extremes are connected together by several intermediate stages.

Teeth.—Throughout the whole group the dentition is rather uniform. All the species have passed the primitive stage: p_3 in the tooth-row, this premolar being invariably external to the row, when not completely wanting. As a general rule, p_2 and p_4 are in contact, not rarely so strongly so that their cingula overlap each other; but sometimes individuals occur in which p_2 and p_4 are distinctly separated, reminiscent of the time when p_3 was situated in the tooth-row. The upper p^2 is small and always in row.

Nose-leaves.—Chief characters: the shape of the sella and the connecting-process.

The sella is approximately ovate or ovate-pyriform. The connecting-process strongly arcuate, almost semicircular in outline, and starting from the very summit of the sella. The internasal lobes slightly larger than usual in the genus. The sella is peculiarly modified in *Rh. inops*, the connecting-process in *Rh. Creaghi*.

There are two well-marked "types" of horseshoe in this group. In the more primitive species the median longitudinal groove separating the two halves of the horseshoe in front is narrow (linear); in the higher developed forms it is broad, more or less pentangular in shape. The former condition is characteristic of the species inhabiting the Philippine Islands and N.E. Borneo (*arcuatus*, *subrufus*, *inops*, *Creaghi*), the latter of the forms distributed over Batchian, Amboina, Timor Laut, and the Key Islands (*euryotis* and its local representatives).

* For similar cranial differences in the *Rh. philippinensis* group, see Ann. & Mag. Nat. Hist. for August 1905, p. 245.

Mental grooves.—No species passes beyond the primitive stage: three mental grooves.

Wing-structure (compare the wing-indices below, on p. 287).—It is a general rule in the genus *Rhinolophus* that in the most primitive species the fourth and fifth metacarpals are equal in length, or, if anything, the fifth a trifle shorter, and III.² less than $1\frac{1}{2}$ the length of III.¹. All the members of the *Rh. arcuatus* group exhibit the slightly more advanced stage in which the fifth metacarpal is a little longer than the fourth, and III.² more than $1\frac{1}{2}$ the length of III.¹.

Tail.—The tail is extremely short, on an average but $\frac{2}{3}$ the length of the lower leg.

Rhinolophus arcuatus exiguus, subsp. n.

Diagnosis.—Similar to the typical *Rh. arcuatus* (from Luzon), but with narrower horseshoe and nasal swellings. Forearm 44·8–46·2 mm.

Skull.—General characters as described above (pp. 281–282). Width of nasal swellings 5–5·2 mm., in typical *arcuatus* 5·6–5·7 mm.

Dentition (three skulls).— p_3 external (one skull, teeth unworn), or quite wanting on one side (one, teeth slightly worn), or on both sides (one, teeth slightly worn). p_2 and p_4 strongly in contact, their cingula overlapping each other.

External characters.—All essential points as in the typical form, but horseshoe decidedly narrower (7·7–8·2 mm., as against 9–10 mm.). Plagiopatagium inserted 1–2·5 mm. above the ankle. Colour (of spirit-specimens) a shade of dark brown, as in the dark phase of *arcuatus typicus*.

Type.—♀ ad. (in alcohol). Zamboanga. Collected by A. Everett, Esq. Brit. Mus. no. 79. 5. 3. 13.

Range.—Zamboanga. Guimarás.

Rhinolophus subrufus, sp. n.

Diagnosis.—Like *Rh. arcuatus*, but much larger. Forearm 53·8–57 mm.

Skull.—As compared with *Rh. arcuatus* premolars and molars comparatively larger; temporal fossa wider, making the zygomatic width decidedly larger than the mastoid width; sagittal crest somewhat higher in front.

Dentition (four skulls).— p_3 external; p_2 and p_4 in contact or slightly separated.

External characters.—In all essential points like a giant modification of *arcuatus*.

Colour.—(1) Red phase. Two skins, adult; Manila; teeth unworn. Above and below “cinnamon-rufous,” a little lighter on the fore part of the back; base of hairs almost “orange-rufous.”

(2) Dark phase. One skin, adult; Mindanao, July; teeth practically unworn. Upperside a very dark shade of “Prout’s brown”; base of hairs and underside “drab.”

Type.—Ad. (skin). Manila. Presented by J. Gould, Esq. Brit. Mus. no. 58. 3. 29. 4.

Range.—Luzon (Manila). Mindanao.

Remarks.—This is the species described by Prof. Peters as “*Rh. rufus*”*. The name *rufus* is preoccupied by Eydoux and Gervais’s “*Rh. luctus*, var. *rufus*”†.

Rhinolophus inops, sp. n.

Diagnosis.—Summit of sella forming a triangular pouch. Forearm 53·8 mm.

Skull.—The *arcuatus* type, but with slightly wider temporal fossa; sagittal crest somewhat higher in front and a little more abruptly descending towards the postnasal depression.

Dentition (one skull).— p_3 external; p_2 and p_4 in contact.

External characters.—The horseshoe, the connecting-process, and the lancet quite of the *subrufus* type, but *summit of sella modified into a small triangular pouch, turning the opening downwards*; greatest depth of the pouch about 1·5 mm. Plagiopatagium inserted 1 mm. above the ankle. Colour (in alcohol) a shade of dark brown.

Type.—♂ ad. (in alcohol). Mt. Apo, at Jodaya, Mindanao, 4000 feet; July 8th, 1904. Collected by Dr. E. A. Mearns (no. 5713). “Bogobo name: Kohs’-set.” U.S. Nat. Mus. no. 125314.

Remarks.—The shape of the sella, *unique in the whole genus*, makes this species readily distinguishable.

* Peters, MB. Akad. Berlin, 1861, p. 710.

† *Conf.* Andersen, Ann. & Mag. Nat. Hist., August 1905, p. 252.

Measurements* of *Rh. arcuatus*, *subrufus*, and *inops*.

	<i>Rh. arcuatus.</i>				<i>Rh. subrufus.</i>		<i>Rh. inops.</i> Type.
	<i>typicus.</i> 2 spems., 2 skulls.		<i>exiguus.</i> 4 spems., 3 skulls.		4 spems., 4 skulls.		
	Min.	Max.	Min.	Max.	Min.	Max.	mm.
Ears, length	17·8	19	17·2	19·7	22	23	23·3
„ greatest breadth	13·2	14·7	13	14	18·8	19	18·3
Nose-leaves, length	15		13·8	14	20		? 18·8
„ breadth of horseshoe	9	10	7·7	8·2	11·5	12·8	12·7
Forearm	45·8	47·8	44·8	46·2	53·8	57	53·8
Tail	17	17·8	15	16·2	23	25	16
Lower leg	20·7	22·7	20·7	21	26·2	29·2	24·7
Skull, total length	21·2	21·7	20	20·8	25		24·2
„ mastoid width	9·8	10·2	9·5	9·8	11·3	11·8	11
„ zygomatic width	9·8	9·9	9·5	9·9	12	12·4	11·5
„ width of nasal swellings ..	5·6	5·7	5	5·2	7	7·1	6·5
Mandibles	14·5	14·8	13·4	14·2	17·8	18·6	17·5
Upper teeth	8·2	8·6	7·9	8	10·3	10·7	10
Lower teeth	8·8	9·2	8·5	8·7	11·2	11·5	10·9

Rhinolophus euryotis timidus, subsp. n.

Diagnosis.—Horseshoe narrower (as compared with the typical form): 10·2–10·7 mm. Forearm 55–57·2 mm. Range: Batchian.

This race is characterized externally by the narrower horseshoe and smaller ears. The brain-case is slenderer, the mandible shorter, and the teeth slightly smaller than in *Rh. e. typicus* and *præstans*. Plagiopatagium inserted 3–4·5 mm. above the ankle.

Colour.—Ad. skin; teeth unworn. Next to “Prout’s brown” above; base of hairs “drab”; underside brownish “drab.” Another skin (ad., teeth unworn) is essentially of the same colour, but more tinged with “Mars brown” above and with “wood-brown” below.

Type.—♀ ad. (in alcohol). Batchian. Collected by Dr. A. R. Wallace. Brit. Mus. no. 60. 1. 10. 5.

* For explanation of measurements, see Ann. & Mag. Nat. Hist., August 1905, p. 248, footnote.

Rhinolophus euryotis, Temm., *typicus*.

Diagnosis.—Horseshoe broad: about 12 mm. Forearm about 57 mm. Range: Amboina.

The Amboina race of *Rh. euryotis* differs from the Batchian form by the broader brain-case, the longer mandible, longer tooth-rows, broader horseshoe, and larger ears; from the Key Island race by the smaller and slenderer skull, narrower nasal swellings, shorter mandible and tooth-rows, and narrower horseshoe. Plagiopatagium inserted 2-5 mm. above the ankle.

Rhinolophus euryotis præstans, subsp. n.

Diagnosis.—Horseshoe very broad: about 13 mm. Forearm 58 mm. Range: Key Islands.

This is the extreme in the size of the horseshoe and the width of the skull and nasal swellings. Plagiopatagium inserted very nearly on the ankle.

Type.—♂ ad. (in alcohol). Key Islands. Purchased. Brit. Mus. no. 99. 12. 4. 4.

Measurements of Rh. euryotis and Subspecies.

	<i>Rh. euryotis.</i>			
	<i>timidus.</i> 3 spems., 3 skulls.		<i>f. typica.</i> ♂ ad.	<i>præstans.</i> ♂ ad. Type.
	Min. mm.	Max. mm.	mm.	mm.
Ears, length	20·5		22·8	23
„ greatest breadth	17		19	18
Nose-leaves, length	17		17·5	19
„ breadth of horseshoe.	10·2	10·7	11·8	13
Forearm	55	57·2	56·8	58
Tail	18·5		20	21·5
Lower leg	25·7	27·8	28	28
Skull, total length	25·1	25·4
„ mastoid width	11·7	12
„ width of brain-case	10·4	10·4	10·8	11·1
„ zygomatic width	11·8	12·2	12·2	12·8
„ maxillar width	8·9	9	8·7	9·8
„ width of nasal swellings ..	6·8	6·9	6·8	7·2
Mandible	17·1	17·5	18	18
Upper teeth	9·7	9·7	10·2	10·2
Lower teeth	10·3	10·5	11	11

Wing-indices.

	<i>Rh. arcuatus</i> , <i>subrufus</i> . 12 spems.	<i>Rh. Creaghi</i> . 1 spem.	<i>Rh. inops</i> . 1 spem.	<i>Rh. euryotis</i> . 6 spems.
Forearm	1000	1000	1000	1000
3rd metacarpal.	706	707	703	702
III. ¹	286	281	292	289
III. ²	458	454	481	436
4th metacarpal.	728	717	725	721
IV. ¹	197	211	199	196
IV. ²	270	263	279	265
5th metacarpal.	742	741	740	734
V. ¹	221	217	205	226
V. ²	237	217	240	233

General Remarks on the Group.

All the species known of the *Rh. arcuatus* group are so far developed as to have the median anterior nasal swellings more abruptly projecting than usual in the genus, the middle lower premolar (p_3) situated external to the tooth-row or quite obliterated, the fifth metacarpal slightly longer than the fourth, and the second phalanx of the third finger lengthened. All these are secondary characters. We lack the direct information as to the affinities of the group, which could have been derived from species on a more primitive level of development. Nevertheless, there can scarcely be any doubt that *the arcuatus group is more closely related to Rh. philippinensis and Rh. macrotis than to any other now existing types of the genus.* The strong development of the nose-leaves, the size of the internasal lobes, the shape of the connecting-process and the lancet, the broad ears, are characters which seem to point in that direction.

Rh. arcuatus is unquestionably the most primitive species of the group, as proved by the slightly less projecting nasal swellings, the small teeth, the narrow temporal fossa, the very low sagittal crest, the normal shape of the horseshoe, the somewhat less pronounced "ovate" shape of the sella. Of the two local forms here discriminated the southern (*Rh. e. exiguus*) is a little higher developed in dentition: p_3 is very often lost; the narrow horseshoe is probably a secondary character.

Rh. subrufus is a modification of the *arcuatus* type: more

projecting nasal swellings, larger premolars and molars, therefore wider temporal fossa and higher sagittal crest; considerably larger size. There is a certain tendency in the genus *Rhinolophus* to a development of a large and a small representative of quite the same "type"; the difference in size is so well marked and without any intergradation that we cannot but recognize them as distinct "species," although they sometimes, as in the present case, inhabit the very same island; thus *Rh. subrufus* (Luzon) bears very much the same relation to *Rh. arcuatus* (Luzon) as *Rh. acuminatus* (Java) to *Rh. minor* (Java), *Rh. Rouxi* (Himalayas) to *Rh. borneensis*, *Rh. megaphyllus* (Australia) to *Rh. simplex* (Lombok).

*Rh. Creaghi**, from the extreme north-east of British N. Borneo (Sandakan), is very closely related to the Philippine *Rh. arcuatus*: the same type of skull, if anything a trifle more advanced in the size of the temporal fossa, but the difference is extremely small indeed; the same shape and size of the nasal swellings; the dentition on quite the same stage as in *arcuatus exiguus* (p_3 rudimentary or wanting); the same shape of the horseshoe, the sella, and the lancet, but more rounded internasal lobes; the broad ears characteristic of the group; the three mental grooves; the same wing-structure; the short tail. But it is unique in the following points:—The connecting-process is obliterated; the median portion of the posterior nose-leaf is peculiarly inflated and provided with a conical tuft of coarse hairs; when pressed backwards the sella leans against *this hair-tuft*, which therefore *practically replaces the missing connecting-process*.

Rh. inops is in every respect, cranial and external (apart from the size), very much like *Rh. arcuatus*, but highly peculiar in the shape of the summit of the sella. The mental grooves do not reach the free border of the lower lip; it would seem to indicate a beginning obliteration of the grooves.

The essential cranial character of the group, viz. the abruptly projecting nasal swellings, culminates in the large and broad-skulled *Rh. euryotis*, in which the front part of the horseshoe is slightly modified. The species reviewed above are confined to the Philippines and N.E. Borneo, *Rh. euryotis* to the islands between Celebes and New Guinea.

The *Rh. arcuatus* group, as here defined, has no representatives in the Ethiopian Region.

* Thomas, Ann. & Mag. Nat. Hist. (6) xviii. (1896) p. 244.